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PHILADELPHIA, PA 19103

EXAMINER

SNELTING, ERIN LYNN

ART UNIT	PAPER NUMBER
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1791

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/530,263	Applicant(s) SEKIDO ET AL.	
	Examiner Erin Snelting	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 18-36 is/are pending in the application.
- 4a) Of the above claim(s) 1-15 and 28-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16 and 18-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 16, 18 and 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Seal '537 (US Patent No. 5,403,537).

3. Regarding claim 16, Seal '537 teaches:

- a. forming a reinforcing fiber substrate as a preform having a fiber volume content, which is a rate of a volume of reinforcing fibers relative to a bulk volume of said reinforcing fiber substrate, lower than a target fiber volume content ("assembling fibrous reinforcements into a desired configuration on a tool body", column 8, lines 3-4; "the preform is compacted after the conformable compaction system is in place, which allows for higher fiber volume parts", column 3, lines 56-58 - Note that the initial fiber volume content is inherently lower than the target fiber volume content because the preform is compacted to a lower volume after being placed in the mold)
- b. placing the reinforcing fiber substrate in a mold ("a preform is placed into a mold", column 3, lines 1-2)

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- c. providing a resin injection line and an evacuation line each communicating with an inside of said mold (“resin inlet tube 19”, column 6, line 9, and “vacuum line 24”, column 6, line 39. See also Fig. 1, items 19 and 24)
- d. reducing pressure in said mold by evacuation (“a vacuum is applied to the laminate”, column 6, lines 1-5)
- e. injecting a resin into said mold and impregnating the resin into said reinforcing fiber substrate to form an FRP molded material to achieve a fiber volume content lower than the target fiber volume content of said FRP molded material (“The resin is allowed to flow into the reinforcement until the reinforcement is fully impregnated, and any remaining air in the reinforcement is removed. Excess resin is initially vented out the vacuum attachment in the center portion of the apparatus and contained in a resin trap”, column 4, line 6 – Note that the target fiber volume content)
- f. stopping injection of the resin (“During the infiltration of laminate 14 with resin, valve 25 is open, valve 26 is closed, and valve 24 is open. After the resin has fully infiltrated laminate 14, and flow of resin into line 24 occurs, the system of flow lines, resin gate 29, fabric ply 34, and laminate 14 are complete saturated with resin. At this point, the various valves 25, 26, and 27 are manipulated (by opening, closing, or partially closing) to manage the resin content in the laminate”, column 6, lines 40-48)
- g. continuing evacuation of the resin until reaching said target fiber volume content (“Excess resin is initially vented out the vacuum attachment in the center

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portion of the apparatus and contained in a resin trap”, column 4, line 68 – column 5, lines 1-3).

4. Regarding claim 18, Seal ‘537 teaches after said injection of resin is stopped, at least one line of resin injection lines is changed to an evacuation line, and said evacuation of resin is continued until reaching said target fiber volume content (“During the infiltration of laminate 14 with resin, valve 25 is open, valve 26 is closed, and valve 24 is open. After the resin has fully infiltrated laminate 14, and flow of resin into line 24 occurs, the system of flow lines, resin gate 29, fabric ply 34, and laminate 14 are complete saturated with resin. At this point, the various valves 25, 26, and 27 are manipulated (by opening, closing, or partially closing) to manage the resin content in the laminate”, column 6, lines 40-48. See also Fig. 1). Note that the presence of valves 25 and 26 enable resin injection line 19 to be converted to a vacuum line connected to resin trap 23 and vacuum 21, as suggested above.

5. Regarding claim 22, the determination of fiber volume content requires a measurement of volume, of which thickness is an inherent measurement parameter.

6. Regarding claim 23, Seal ‘537 teaches an injection amount of resin corresponding to said fiber volume content lower than said target fiber volume content is preset, and said injection of resin is stopped at the time reaching said injection amount preset (“After the resin has fully infiltrated laminate 14, and flow of resin into line 24 occurs, the system of flow lines, resin gate 29, fabric ply 34, and laminate 14 are complete saturated with resin. At this point, the various valves 25, 26, and 27 are manipulated (by opening, closing, or partially closing) to manage the resin content in the

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laminate”, column 6, lines 42-48). Note that managing the resin content implies predetermined process parameters including volumes of resin to be injected and evacuated. Also, the injection of excess resin leading to a fiber volume content lower than said target fiber volume content is implicit in the fact that resin flows into line 24, which is the vacuum line connected to the resin trap.

7. Regarding claim 24, Seal ‘537 teaches an evacuation amount for reaching said target fiber volume content is preset relative to an injection amount of resin, and said evacuation of resin is stopped at the time reaching said evacuation amount preset (After the resin has fully infiltrated laminate 14, and flow of resin into line 24 occurs, the system of flow lines, resin gate 29, fabric ply 34, and laminate 14 are complete saturated with resin. At this point, the various valves 25, 26, and 27 are manipulated (by opening, closing, or partially closing) to manage the resin content in the laminate”, column 6, lines 42-48). Note that managing the resin content implies predetermined process parameters including volumes of resin to be injected and evacuated. Also, the injection of excess resin leading to a fiber volume content lower than said target fiber volume content is implicit in the fact that resin flows into line 24, which is the vacuum line connected to the resin trap.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seal (US Patent No. 5,403,537) as applied to claim 16 above, and further in view of Mizukami (WO 01/00392 A1).

11. Regarding claim 19, Seal '537 does not teach target fiber volume content is in a range of 55 to 65%. In analogous art of manufacturing fiber reinforced composite articles, Mizukami '392 teaches target fiber volume content is in a range of 55 to 65% ("the content of the reinforcing fibers is preferably from 15 to 80 vol%, more preferably from 20 to 70 vol%, translation p. 15, lines 21-23) for the benefit of manipulating strength properties of the molded product. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of Seal '537 with the fiber volume content of Mizukami '392 for the benefit of manipulating strength properties of the molded product. Note that the range of from 15 to 80% of Mizukami '392 includes the claimed range of 55 to 65%.

12. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seal (US Patent No. 5,403,537).

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13. Regarding claim 20, Seal '537 does not teach fiber volume content lower than said target fiber volume content is in a range of 45 to 60%. However, Seal '537 does teach supplying an excess amount of resin which is subsequently evacuated from the mold. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed fiber volume content lower than said target fiber volume content as claimed, in order to form the conventional product as described, as such is well within the level of ordinary skill in the art for achieving a composite product as disclosed. Note that discovery of an optimum range is well within the level of ordinary skill in the art, and such ranges will not support patentability absent a showing to the contrary, as it is not inventive to discover an optimum range by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

14. Regarding claim 21, Seal '537 does not teach fiber volume content lower than said target fiber volume content is in a range of 45 to 55%. However, Seal '537 does teach supplying an excess amount of resin which is subsequently evacuated from the mold. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed fiber volume content lower than said target fiber volume content as claimed, in order to form the conventional product as described, as such is well within the level of ordinary skill in the art for achieving a composite product as disclosed. Note that discovery of an optimum range is well within the level of ordinary skill in the art, and such ranges will not support patentability absent a showing to the contrary, as it is not inventive to discover an optimum range by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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15. Claims 25, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seal (US Patent No. 5,403,537) as applied to claim 16 above, and further in view of Kimura (JP 56127426) (English translation provided).

16. Regarding claim 25, Seal '537 does not teach at least one layer of said reinforcing fiber substrate comprises a carbon fiber layer. In analogous art of manufacturing fiber reinforced composite articles, Kimura '426 teaches at least one layer of said reinforcing fiber substrate comprises a carbon fiber layer ("the fiber reinforcing material is prepared as one type or a combination of two or more types of the following fibers selected according to the specific purpose: ...carbon fibers", translation page 4, lines 18-19) for the benefit of obtaining a high strength and lightweight product. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of Seal '537 with the carbon fibers of Kimura '426 for the benefit of obtaining a high strength and lightweight product.

17. Regarding claim 26, Seal '537 teaches a woven fabric ("The fibrous reinforcements which form a laminate can be plies of fabric, mat, or stitched preforms", column 4, lines 48-49), but Seal '537 does not teach carbon fiber layer is formed as a woven fabric. In analogous art of manufacturing fiber reinforced composite articles, Kimura '426 teaches carbon fiber layer is formed as a woven fabric ("the fiber reinforcing material is prepared as one type or a combination of two or more types of the following fibers selected according to the specific purpose: ...carbon fibers...The forms of the fiber reinforcing material include mat shape, cloth shape and/or roving shape", translation page 4, lines 18-21) for the benefit of maintaining preform shape

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during resin injection. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of Seal '537 with the carbon fibers of Kimura '426 for the benefit of maintaining preform shape during resin injection.

18. Regarding claim 27, Seal '537 teaches woven fabric as shown regarding claim 26, but Seal '537 does not teach woven fabric is formed as a unidirectional woven fabric. In analogous art of manufacturing fiber reinforced composite articles, Kimura '426 teaches woven fabric is formed as a unidirectional woven fabric ("The forms of the fiber reinforcing material include mat shape, cloth shape and/or roving shape, either isotropic or anisotropic", translation page 4, lines 20-21) for the benefit of manipulating properties of the final manufactured product. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of Seal '537 with the unidirectional woven fabric of Kimura '426 for the benefit of manipulating properties of the final manufactured product.

Response to Arguments

19. Applicant's arguments with respect to claim 16 filed 12-15-2008 have been fully considered but they are not persuasive. Applicant's arguments appear to be on the following grounds:

- a. Seal '537 does not disclose forming the reinforcing substrate as a preform having a fiber volume content lower than a target fiber volume content, and thus does not teach all elements of amended claim 16.

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- b. The amended claim 16 defines the fiber volume content of the preform in terms of a concrete structural component, thereby further defining applicant's invention over Seal '537.

Response:

- a. Seal '537 teaches the preform is compacted after being placed in the mold (column 3, lines 1-2 and column 3, lines 56-58). Thus the preform has an initial bulk volume that is greater than a compacted bulk volume during processing and curing. The volume of the reinforcing fibers themselves is constant, therefore the initial fiber volume content of the preform, as defined by applicant, is inherently lower than the target fiber volume content that is achieved during processing. Seal '537 further teaches that a benefit of the described method is the ability to manufacture higher fiber volume parts, as also described in applicant's specification, quoted on pages 8-9 of applicant's remarks.
 - b. Examiner notes the improved definition of fiber volume content, but this does not define applicant's invention over Seal '537 as described above.
20. Applicant's arguments with respect to claims 19-21 and 25-27 have been considered but are moot in view of the new ground(s) of rejection. Applicant requested that these rejections be withdrawn only because of their dependence on the allegedly deficient rejection of claim 16, not on the basis of the individual rejections. However, Seal '537 does disclose all elements of amended claim 16 as described above. Thus the rejections of 19-21 and 25-27 are held under the new rejection of the amended claim 16.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin Snelting whose telephone number is (571)272-7169. The examiner can normally be reached on Monday to Friday 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571)272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/
Supervisory Patent Examiner, Art
Unit 1791

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